REMARKS

Claims 1-21 are pending in the application. Claim 1 is herein amended. Claim 21 is newly added. No new matter has been added to the application.

Claim Rejections - 35 U.S.C. § 112

Claim 2 was rejected under 35 U.S.C. § 112, second paragraph. The Office Action states that the claims fail to conform with U.S. Patent Practice. The Office Action also specifically states that in claim 2, it is unclear whether the first plunger is normally disposed in a manner where it urges the valve section or whether this condition is a result of the second plunger being urged toward the first plunger when the solenoid is energized.

Claim 1 has been amended to conform with U.S. Patent Practice.

Regarding claim 2, applicants respectfully submit that the claim is clear. Claim 2 recites that the first plunger is "in a state urged *for opening* the valve section." The claim does not recite the valve section is necessarily in an open state, just that the first plunger is in a state urged for opening the valve section. Fig. 1 of the present application shows an embodiment in which the solenoid is deenergized. In this embodiment, spring 24 has a larger spring force than spring 17 causing the valve section to be urged in an open position. In Figs. 2 and 3, the solenoid is energized. In Fig. 2, the solenoid is supplied with maximum control current. The second plunger attracts the first plunger, overcoming the urging force of the first plunger causing the valve section to close. In Fig. 3, the control current is adjusted for steady operation. In this state, the integrated first and second plunger adjusts the opening of the valve section by balancing the

suction pressure, the loads of springs 17, 24 and 36, and the attractive force of the solenoid. (Specification, page 14, lines 13-27.) Whether, the solenoid is energized or not, the first plunger is in a state urged for opening the valve section due to the force of spring 24.

Applicants also note that claim 21 has been added to further define the function of the first and second plungers. Support for claim 21 can be found in the Specification at page 12, line 21 to page 15, line 23.

The Office Action also states that the use of the word "attracted" in claim 2 is improper. Applicants respectfully submit that the word "attracted" in claim 2 is proper. The second plunger is attracted to the first plunger by, *e.g.*, electromagnetic attraction. (*See, e.g.*, specification, page 12, lines 12-20.)

Withdrawal of the rejection is requested.

Claim Rejections - 35 U.S.C. §§ 102 and 103

Claims 1-3, 6-9 and 17-20 were rejected under 35 U.S.C. § 102(b) as being anticipated by Taguchi (U.S. Patent 5,332,365, hereinafter referred to as "**Taguchi '365**"); claims 1 and 10-13 were rejected under 35 U.S.C. § 102(b) as being anticipated by Taguchi (U.S. Patent 5,165,863, hereinafter referred to as "**Taguchi '863**"); claims 14-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over **Taguchi '365**; and claims 4 and 5 were rejected under 35 U.S.C. § 103(a) as being unpatentable over **Taguchi '365** in view of **Burkett** (U.S. 6,688,853).

Favorable reconsideration is requested.

The control valve of the present invention has a valve section for controlling a flow rate of refrigerant flowing from the discharge chamber to the crankcase of the variable displacement compressor. In the control valve for a clutchless variable displacement compressor, when the solenoid is deenergized, the valve section should be fully opened so that the variable displacement compressor operates at the minimum capacity. The valve section of the present invention is held in the fully opened state by a first separated plunger urging the valve section in a direction away from a pressure-sensing member. At this time, the pressure-sensing member disposed between the first plunger and the second plunger is urged by a suction pressure in a direction away from the first plunger toward the second plunger, and the first plunger never comes into contact with the pressure-sensing member. Therefore, the first plunger is not affected by the pressure no matter how much the pressure of the refrigerant cycle including the suction pressure varies. As a result, the valve section can keep the fully opened state.

When the solenoid is energized, the first plunger and the second plunger, which are separated, are electromagnetically attracted to each other and are integrated with the pressure-sensing member.

Further, in the control valve of the present invention, the pressure-sensing member for sensing a suction pressure is disposed between the first plunger and the second plunger which are separated. According to this configuration, with the pressure-sensing member as a border, the first plunger side receives a pressure of the refrigerant cycle while the members on the second plunger side may be exposed to atmosphere.

Generally speaking, a solenoid comprises a coil, a core that is a fixed core, a plunger that is a movable core, and a yoke. The core and the plunger are disposed at the center of the coil with the yoke surrounding the coil. A magnetic flux generated by flowing a current through the coil flows through the core, the plunger, and the yoke forming a magnetic circuit, which generates an attractive force between the plunger and the core, which in turn moves the movable plunger linearly to be attracted to the fixed core. The attractive force becomes stronger as smaller gaps are formed between the core and the plunger, and the yoke, which form the magnetic circuit. That is to say, it is necessary to form in the solenoid a closed circuit with gaps formed between the core and the plunger, and the yoke as small as possible, except for a variable gap between the core and the plunger.

In the control valve of FIG. 1 of the present application, the hollow cylindrical member 20 surrounding the first plunger 21, the case 27 surrounding the coil 29, and the knob 34 physically connecting the case 27 and the core 31 are made of magnetic materials, and they serve as a yoke in a magnetic circuit of the solenoid. (*See* page 12, lines 12-20). Thereby, the magnetic flux generated at the coil 29 flows through a magnetic circuit comprising the case 27, the hollow cylindrical member 20, the first plunger 21, the second plunger 32, the core 31, and the knob 34. Applicants note that the hollow cylindrical member 20 is disposed close to the first plunger 21 in order to form the magnetic circuit. By being surrounded by the magnetic hollow cylindrical member 20, the first plunger 21 functions as a part of the plunger of the solenoid.

Applicants respectfully submit that neither Taguchi '365 nor Taguchi '863 disclose

> a plunger of a solenoid, said plunger is divided into a first plunger and a second plunger, and a pressure-sensing member is disposed between the first plunger and the second plunger, for sensing suction pressure in a suction chamber

as recited in claim 1.

Regarding Taguchi '365, the Office Action takes the position that the second cylindrical rod 481 and the first cylindrical rod 460 of Taguchi '365 correspond to first and second plungers, respectively, as recited in claim 1. (Office Action, page 3.) However, first and second cylindrical rods 481 and 460 of Taguchi '365 are not plungers and do not combine to form a plunger.

In Taguchi '365, the cylindrical member 451 corresponds to a plunger of a solenoid, and not the second cylindrical rod 481 or the first cylindrical rod 460. (*See* Fig. 3.) The second cylindrical rod 481 is designed to transmit the movement of the cylindrical member 451 to the diaphragm 483, and the first cylindrical rod 460 is designed to transmit the displacement of the diaphragm 483 to the first valve member 480 and the ball element 492. Rods 481 and 460 do not function as a plunger. This analysis derives from the fact that the top end of the solenoid is terminated by the first annular plate 411 integrally formed with a core (axial annular projection 412), which means that a magnetic circuit is not formed on the diaphragm 483 side. Therefore, the second cylindrical rod 481 does not form a magnetic circuit. In addition, the first cylindrical rod 460 is made of non-magnetic material so as not to be attracted and stuck to the core (axial annular projection 412) when the solenoid is energized. Therefore, rod 460 also does not form a

magnetic circuit. Taguchi '365 does not disclose a plunger divided into first and second plungers. Therefore, Taguchi '365 does not disclose the elements as recited in claim 1.

Regarding Taguchi '863, the Office Action takes the position that valve member 480 and rod 460 correspond to the first plunger and second plunger, respectively, as recited in claim 1. (Office Action, page 8.) However, valve member 480 and rod 460 are not plungers and do not combine to form a plunger.

In Taguchi '863, cylindrical member 451 corresponds with a plunger, and not valve member 480 and rod 460. (*See* Fig. 2.) Valve member 480 moves in response to the displacement of the diaphragm 418, and the rod 460 is designed to transmit the movement of the cylindrical member 451 to the diaphragm 418. Therefore, the valve member 480 and the rod 460 do not function as a plunger. Taguchi '863 does not disclose a plunger divided into first and second plungers. Therefore, Taguchi '863 does not disclose the elements as recited in claim 1.

Applicants respectfully submit that Taguchi '863 does not disclose "wherein shock-absorbing means is disposed between the pressure-sensing member and the first plunger" as recited in claim 10.

The Office Action takes the position that circular plate 482 corresponds with shock-absorbing means recited in claim 10. (Office Action, page 8.)

Circular plate 482 disposed at the opening end of first axial hole 481 of valve member 480 is designed to transmit the displacement of diaphragm 418 to valve member 480 and to receive the second coil spring 485b urging the ball member 485a of the differential pressure

valve contained in the valve member 480 in the valve-closing direction. The circular plate 482 does not function as a shock absorbing means. In the control valve of Taguchi '863, valve member 480 is urged by the third coil spring 491 so that the circular pate 482 always contacts the diaphragm 418. (*See* Fig. 2.) Deenergizing or emerging the solenoid does not cause the circular plate 482 to separate from or come into conflict with the diaphragm 418. Therefore, there the circular plate 482 does not absorb impact generated by coming into conflict with the diaphragm 418. Taguchi '863 does not disclose a shock-absorbing means. Thus, Taguchi '863 does not disclose the elements as recited in claim 10.

For at least the foregoing reasons, claims 1 and 10 are patentable over the cited references, and claims 2-9 and 11-20 are patentable by virtue of their dependence from claim 1.

Accordingly, withdrawal of the rejection of claims 1-20 is hereby solicited.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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